AMENDMENTS TO THE CLAIMS

This listing of the claims will replace all prior versions and listings of the claims.

1. (Original) A mutein of a bone morphogenetic protein, whereby the mutein comprises an amino acid substitution compared to the wildtype of the bone morphogenetic protein at the amino acid position corresponding to amino acid position 51 of human BMP-2.

2. (Currently amended) The mutein according to claim 1, whereby the amino acid at the position corresponding to amino acid position 51 of human BMP-2 is leucine in the wildtype form of the bone morphogenetic protein and is ~~preferably~~ proline in the mutein.

3. (Original) The mutein according to claim 1 and 2, whereby the bone morphogenetic protein is selected from the group comprising hBMP-2, hBMP-4, hBMP-5, hBMP-6, hBMP-7, hBMP-8, hGDF-5, mGDF-6, mGDF-7, hBMP-10 and hGDF-2.

4. (Currently amended) The mutein according to ~~any of claims 1 to~~ claim 3, whereby

- the bone morphogenetic protein is hBMP-2 and the position corresponding to amino acid position 51 of human BMP-2 is amino acid position 51;
- the bone morphogenetic protein is hBMP-4 and the position corresponding to amino acid position 51 of human BMP-2 is amino acid position 53;
- the bone morphogenetic protein is hBMP-5 and the position corresponding to amino acid position 51 of human BMP-2 is amino acid position 68;

- the bone morphogenetic protein is hBMP-6 and the position corresponding to amino acid position 51 of human BMP-2 is amino acid position 68;

- the bone morphogenetic protein is hBMP-7 and the position corresponding to amino acid position 51 of human BMP-2 is amino acid position 75;

- the bone morphogenetic protein is hBMP-8 and the position corresponding to amino acid position 51 of human BMP-2 is amino acid position 75;

- the bone morphogenetic protein is hGDF-5 and the position corresponding to amino acid position 51 of human BMP-2 is amino acid position 56;

- the bone morphogenetic protein is mGDF-6 and the position corresponding to amino acid position 51 of human BMP-2 is amino acid position 56;

- the bone morphogenetic protein is mGDF-7 and the position corresponding to amino acid position 51 of human BMP-2 is amino acid position 82;

- the bone morphogenetic protein is hBMP-10 and the position corresponding to amino acid position 51 of human BMP-2 is amino acid position 44; and

- the bone morphogenetic protein is hGDF-2 and the position corresponding to amino acid position 51 of human BMP-2 is amino acid position 45.

5. (Currently amended) The mutein according to ~~any of claims 1 to~~ claim 4, wherein the wildtype of

- hBMP-2 comprises an amino acid sequence according to SEQ ID No. 1;

- hBMP-4 comprises an amino acid sequence according to SEQ ID No. 3;

- hBMP-5 comprises an amino acid sequence according to SEQ ID No. 5;

- hBMP-6 comprises an amino acid sequence according to SEQ ID No. 7;

- hBMP-7 comprises an amino acid sequence according to SEQ ID No. 9;
- hBMP-8 comprises an amino acid sequence according to SEQ ID No. 11;
- hGDF-5 comprises an amino acid sequence according to SEQ ID No. 13;
- mGDF-6 comprises an amino acid sequence according to SEQ ID No. 15;
- mGDF-7 comprises an amino acid sequence according to SEQ ID No. 17;
- hBMP-10 comprises an amino acid sequence according to SEQ ID No. 19; and
- hGDF-2 comprises an amino acid sequence according to SEQ ID No. 21.

6. (Original) The mutein according to claim 5, whereby the wildtype of

- hBMP-2 is encoded by a nucleic acid according to SEQ ID No. 2;
- hBMP-4 is encoded by a nucleic acid according to SEQ ID No. 4;
- hBMP-5 is encoded by a nucleic acid according to SEQ ID No. 6;
- hBMP-6 is encoded by a nucleic acid according to SEQ ID No. 8;
- hBMP-7 is encoded by a nucleic acid according to SEQ ID No. 10;
- hBMP-8 is encoded by a nucleic acid according to SEQ ID No. 12;
- hGDF-5 is encoded by a nucleic acid according to SEQ ID No. 14;
- mGDF-6 is encoded by a nucleic acid according to SEQ ID No. 16;
- mGDF-7 is encoded by a nucleic acid according to SEQ ID No. 18;
- hBMP-10 is encoded by a nucleic acid according to SEQ ID No. 20; and

- hGDF-2 is encoded by a nucleic acid according to SEQ ID No. 22.

7. (Original) A bone morphogenetic mutein, whereby the mutein is not binding to a first bone morphogenetic protein receptor and the mutein is binding to at least a modulator protein, whereby the modulator protein is selected from the group comprising the noggin protein family, the DAN protein family, the chordin protein family and the cysteine-knot-containing BMP modulator proteins.

8. (Currently amended) [[A]]The bone morphogenetic mutein~~, preferably~~ according to claim 7[[1]], comprising a pre-helix loop structure which interacts with a second bone morphogenetic protein receptor.

9. (Currently amended) The bone morphogenetic mutein according to claim ~~7 and~~ 8, whereby the first and/or the second bone morphogenetic protein receptor is BRIA or BRIB.

10. (Currently amended) The bone morphogenetic mutein according to claim ~~8 and~~ 9, whereby the interaction is related to ~~an amino acid residue, preferably~~ amino acid residue Gln86 of BRIA or Gln 67 of BRIB.

11. (Currently amended) A bone morphogenetic mutein~~, preferably~~ according to claim 8~~any of claims 6 to 10, comprising a pre-helix loop structure having an interaction with a second bone morphogenetic protein receptor~~, whereby the interaction of the pre-helix loop structure of the bone morphogenetic mutein with the second bone morphogenetic protein receptor is different from the interaction of the pre-helix loop structure of the wildtype bone morphogenetic protein with the second bone morphogenetic protein receptor.

12. (Currently amended) The bone morphogenetic mutein according to ~~any of claims 8 to~~ claim 11, whereby the different interaction or the change is represented in ~~refraction~~ diffraction data~~, preferably such refraction data being~~ acquired ~~at room temperature~~ to a resolution of at least about 2.7 Å.

13. (Currently amended) The bone morphogenetic mutein according to claim 11~~any of claims 7 to 12~~, whereby the pre-helix loop structure is mutated compared to the wildtype of the bone morphogenetic protein.

14. (Original) The bone morphogenetic mutein according to claim 13, whereby the amino acid corresponding to leucine at position 51 of the wildtype BMP-2 is mutated.

15. (Currently amended) The bone morphogenetic mutein according to claim ~~13 or~~ 14, whereby the amino acid corresponding to leucine at position 51 of human BMP-2 is mutated to proline.

16. (Currently amended) The bone morphogenetic mutein according to claim 7~~any of claims 7 to 15~~, whereby the bone morphogenetic mutein is a mutein of a bone morphogenetic protein selected from the group comprising hBMP-2, hBMP-4, hBMP-5, hBMP-6, hBMP-7, hBMP-8, hGDF-5, mGDF-6, mGDF-7, hBMP-10 and hGDF-2.

17. (Original) The bone morphogenetic mutein according to claim 16, whereby the bone morphogenetic protein is BMP-2 or pro-BMP-2.

18. (Original) A bone morphogenetic protein comprising an amino acid sequence according to any of SEQ ID Nos. 23 to 33.

19. (Currently amended) The bone morphogenetic mutein according to claim 7[[18]], whereby the bone morphogenetic mutein comprises an amino acid sequence according to any of SEQ ID Nos. 23 to 33~~is a bone morphogenetic mutein according to any of claims 7 to 18~~.

20. (Currently amended) A nucleic acid coding for a bone morphogenetic mutein according to ~~any of claims 1 to 19~~claim 1 and/or a complementary strand thereto.

21. (Currently amended) The nucleic acid according to claim 20, wherein the nucleic acid comprises ~~A nucleic acid comprising~~ a nucleic acid sequence according to SEQ ID Nos. 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 and 22~~, preferably coding for a bone morphogenetic mutein according to any of claims 1 to 19,~~ and/or a complementary strand thereto.

22. (Currently amended) A nucleic acid coding for a bone morphogenetic mutein ~~according to any of claims 1 to 19~~, whereby the nucleic acid would hybridize to the nucleic acid according to claim 20 ~~or 21~~ but for the degeneracy of the genetic code~~, more preferably~~ under stringent conditions.

23. (Currently amended) A vector comprising a nucleic acid according to claim 20~~any of claims 20 to 22, whereby the vector is preferably an expression vector~~.

24. (Currently amended) A cell~~, preferably a mammalian cell,~~ comprising a nucleic acid according to claim 20~~any of claims 20 to 22 and/or a vector according to claim 23~~.

25. (Currently amended) A host organism~~, preferably a mammalian host organism and more preferably a non-human host organism~~ comprising a cell according to claim 24.

26. (Currently amended) A method for the production of a bone morphogenetic mutein ~~according to any of claims 1 to 19~~, comprising the steps of

a) cultivating a cell according to claim 24[[25]] in a cultivation broth and

b) preparing the bone morphogenetic mutein from the cell and/or from the cultivation broth.

27. (Currently amended) A monoclonal antibody specifically binding to a bone morphogenetic mutein according to claim 1~~any of claims 1 to 19~~.

28. (Currently amended) A composition comprising a mutein according to claim 1 or 7 and a pharmaceutically acceptable carrier~~any of claims 1 to 19 and/or a nucleic acid according to any of claims 20 to 22~~.

29. (Currently amended) A ~~pharmaceutical~~ composition comprising ~~a mutein according to any of claims 1 to 19 or~~ a nucleic acid according to ~~any of claims 20 to 22,~~ claim 20 and a pharmaceutically acceptable carrier.

30. (Cancelled)

31. (Currently amended) ~~Use according to claim 30, wherein the medicament is~~ A method for the treatment and/or prevention of a disease selected from the group comprising fibrotic diseases, wound healing, hypervascularization, vascular diseases, fractures, and osteoporosis, comprising administering to a patient a bone morphogenetic mutein according to claim 1.

32. (Currently amended) The ~~use~~ method according to claim 31, whereby the fibrotic disease is selected from the group comprising renal fibrosis, hepatic cirrhosis, pulmonary fibrosis and chronic inflammation~~, preferably chronic inflammation associated with asthma~~.

33. (Currently amended) The ~~use~~ method according to claim 31, wherein the wound healing is related to keloid, cicatrization, and peritoneal obliteration.

34. (Currently amended) The ~~use~~ method according to claim 31, whereby the hypervascularization is related to or associated with retinopathies, arteriosclerosis and/or tumors.

35. (Currently amended) The method ~~Use~~ according to claim 31, whereby the fractures are non-healing fractures.

36. (Currently amended) The ~~use~~ method according to claim 31, whereby the disease is osteoporosis.

37. (Currently amended) A method for inhibiting ~~Use of a morphogenetic mutein according to any of claims 1 to 19 as inhibitor to~~ a BMP interacting protein, comprising administering to a patient a bone morphogenetic mutein according to claim 1.

38. (Currently amended) The ~~use~~ method according to claim 37, wherein the BMP interacting protein is selected from the group comprising the noggin protein family, the DAN protein family and the chordin protein family.